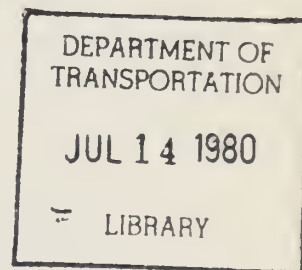


# **COST EVALUATION FOR NINE FEDERAL MOTOR VEHICLE STANDARDS VOLUME II FMVSS 108**

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FINAL REPORT**

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15. Supplementary Notes		
16. Abstract <p>The consumer cost was established for the implementation cost of each of the nine Federal Motor Vehicle Safety Standards. The standards study are:</p> <ul style="list-style-type: none"> <li>FMVSS 105 Hydraulic Brake Systems on Passenger Cars</li> <li>FMVSS 108 Side Marker Lamps</li> <li>FMVSS 122 Motorcycle Brake Systems</li> <li>FMVSS 202 Head Restraints</li> <li>FMVSS 207 Seating Systems</li> <li>FMVSS 213 Child Seating Systems</li> <li>FMVSS 220 School Bus, Rollover Protection</li> <li>FMVSS 221 School Bus, Joint Strength</li> <li>FMVSS 222 School Bus, Seating and Crash Protection</li> </ul> <p>For each standard a representative sample of makes and models of vehicles or components was established. The components required to meet the standard were purchased and their costs estimated. The first year of the imposition of the standard and the year immediately preceding it were emphasized. By analysis, the consumer costs attributed to the standard for each make and model or components were determined. A weighted average was developed from the samples and applied to the total industry volumes to determine the consumer cost for the implementation of each standard. The weighted average of weight variance due to the implementation of the standard was also determined. The before and after cost variance was not applied to FMVSS 213 Child Seating Systems and the FMVSS 122 Motorcycle Brake Systems.</p>		
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# METRIC CONVERSION FACTORS

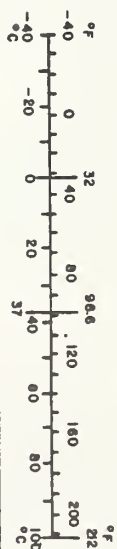
## Approximate Conversions to Metric Measures

Symbol	What You Knew	Multiply by	To Find	Symbol
<b>LENGTH</b>				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.5	kilometers	km
<b>AREA</b>				
in <sup>2</sup>	square inches	6.5	square centimeters	cm <sup>2</sup>
ft <sup>2</sup>	square feet	0.09	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yards	0.8	square meters	m <sup>2</sup>
mi <sup>2</sup>	square miles	2.6	square kilometers	km <sup>2</sup>
	acres	0.4	hectares	hs
<b>MASS (weight)</b>				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
<b>VOLUME</b>				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
p	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft <sup>3</sup>	cubic feet	0.03	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.75	cubic meters	m <sup>3</sup>
<b>TEMPERATURE (exact)</b>				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

\*1 in = 2.54 exactly. For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C13.10/286.

## Approximate Conversions from Metric Measures

Symbol	What You Knew	Multiply by	To Find	Symbol
<b>LENGTH</b>				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
<b>AREA</b>				
cm <sup>2</sup>	square centimeters	0.16	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	1.2	square yards	yd <sup>2</sup>
km <sup>2</sup>	square kilometers	0.4	square miles	mi <sup>2</sup>
ha	hectares (10,000 m <sup>2</sup> )	2.5	acres	
<b>MASS (weight)</b>				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
<b>VOLUME</b>				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	p
l	liters	1.05	quarts	qt
m <sup>3</sup>	liters	0.26	gallons	gal
m <sup>3</sup>	cubic meters	35	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.3	cubic yards	yd <sup>3</sup>
<b>TEMPERATURE (exact)</b>				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



## ABSTRACT

### FMVSS 108 SIDE MARKER LAMPS

Under Contract DOT-HS-8-02015 the Contractor conducted a program to determine the implementation consumer cost and weight variance per vehicle caused by the implementation of FMVSS in January 1970. This study is direct to the implementation of the lamps to the system. Baseline systems were established and a cost and weight variance was considered the implementation cost and weight. A volume weighted average was prepared for the four car classes in the years of implementation. The weighted average factors were applied to the 1979 car volumes. The implementation resulted in a consumer cost increase of \$2.89 and a weight increase of .38 pounds.

The Halogen Lamp was studied and the consumer cost was estimated to be \$3.21 each. Weight of the lamp was 1.1 pounds.





## PREFACE

The Contractor, the De Lorean Motor Company, in the presentation of the Final Report on the Cost Evaluation for Nine Federal Motor Vehicle Standards has divided the report into six major categories. Each volume contains the complete study related to the designated standard or standards. The Contractor acknowledges the contribution of its staff, the automotive manufacturing community and the automotive dealers. Special acknowledgement is made to the Contract Technical Manager, Mr. Robert Lemmer of the National Highway Traffic Safety Administration, Department of Transportation, for his contributions and timely reviews throughout the program.

The cost estimating techniques employed in the study are based on automotive industry practice and have been previously used on other programs by the Contractor. The following listing includes recent and current programs using essentially the same estimating procedures and techniques as those employed in this study:

- Contract NHTSA-DOT-HS-7-01770

Development of a Motor Vehicle Materials Historical,  
High-Volume Industrial Processing Rates Cost Data  
Bank - Ford F-100 Truck

FMVSS 201 Study of passenger car requirements as  
applied to light trucks and vans.

FMVSS 203 and 204 Study of passenger car require-  
ments as applied to light trucks and vans.

- Contract NHTSA-DOT-HS-8-01767  
Cost Evaluation of Four Federal Motor Vehicle Safety Standards.  
  
Cost Review of Pedestrian Safety Modifications.
- Contract NHTSA-DOT-HS-9-02258  
Cost Evaluation of Three Federal Motor Vehicle Safety Standards.
- Renault USA, Inc.  
Consumer Cost Estimate of Subcompact Vehicles.
- De Lorean Motor Company  
Manufacturing Cost Studies of Components of lightweight vehicles.
- Contract NHTSA-DOT-HS-9-02112  
Preliminary incremental cost estimating for the implementation of the extension of FMVSS 105 to light trucks, vans and MVTs.

Study the cost and weight change for passenger car pedestrian initial impact protection implementation.

Product feasibility, consumer cost and implementation schedule analysis for implementing brake inspectability requirements.

Cost data developed on this program for automotive standards are based on 1979 Model Year Economics and 1978 macro-analysis of automotive and component manufacturers. For standards related to other than automotive manufacturers,



the data is based on 1979 year economics and macro-analysis factors applicable to the manufacturers. Dealer discount on related automotive products was established at 16.97% for the industry. A dealer discount of 25% was applied for the motorcycle related products. The child seats dealer discounts varied from 40% to 50%. Distributor cost where applicable is reflected in the dealer wholesale cost.

In reviewing this report, the reader is cautioned that the application of an average cost per pound factor that can be developed from the data presented could result in serious cost errors. Cost data can only effectively be developed by using manufacturing processing personnel applying automotive cost estimating technology. For any cost factor to be effective the designs, size, construction, and manufacturing techniques must be nearly the same. In this report a considerable variation can be noted in the cost and weight of what appears to be similar components. Only a detailed review of these components would explain the variation.



## PROGRAM INDEX

VOLUME I	- FMVSS 105	HYDRAULIC BRAKE SYSTEMS ON PASSENGER CARS
VOLUME II	- FMVSS 108	LAMPS, REFLECTIVE DEVICES AND ASSOCIATED EQUIPMENT
VOLUME III	- FMVSS 122	MOTORCYCLE BRAKE SYSTEMS
VOLUME IV	- FMVSS 202	HEAD RESTRAINTS
	FMVSS 207	SEATING SYSTEMS
VOLUME V	- FMVSS 213	CHILD SEATING SYSTEMS
VOLUME VI	- FMVSS 220	SCHOOL BUS, ROLLOVER PROTECTION
	FMVSS 221	SCHOOL BUS, JOINT STRENGTH
	FMVSS 222	SCHOOL BUS, SEATING AND CRASH PROTECTION



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# COST EVALUATION OF NINE FEDERAL MOTOR VEHICLE STANDARDS VOLUME II FMVSS 108 SIDE MARKER LAMPS, AND HIGH INTENSITY HEADLIGHTS

## INTRODUCTION

Under Contract DOT-HS-8-02015, the Contractor conducted a program that developed consumer cost of the implementation of the side marker lamps to meet the January 1970 standard requirement for passenger cars. The consumer cost of a high intensity headlamp was also determined.

An Integrated Cost Sampling Plan was developed, approved by the Contract Technical Manager, and followed to obtain, if any, changes in cost and weight of the side marker lamp systems due to implementation of the standard.

Specimen vehicles were selected and system components purchased that represented a large share of the industry, all four major size classes, and typical side marker lamps installations of the various manufacturers. Automotive industry type teardown and manufacturing cost estimating techniques were applied to develop cost and weight data for the implementation analysis.

Appendix A of this report represents a summary of cost elements and weight of components involved in the study. In Figure 1 elements of component cost are shown. The boxes with the solid lines contain data derived from the cost and weight processing of components

of the systems studied. Those with dotted boxes are cost elements considered in the estimating processing and the summarized results are contained in the costs in Appendix A.

In this study, the consumer cost is the summation of the variable cost, corporation other cost and profit and dealer markup. The variable cost is considered as those costs that vary with the volume of production and consist of the cost of direct material, direct labor and variable burden. The Other Cost and Profit consist of those items identified in Figure 1 and 1A and are:

- Indirect Material
- Indirect Labor
- Fixed Burden
- Tooling Cost
- Engineering and Warranty Cost
- Selling and Administration Cost
- Other Corporate Costs
- Corporation Profits
- Distributor Cost

The Dealer-Markup consists of the dealers expense and profit.

The costs included in Appendix A are variable cost, dealer wholesale, dealer mark-up, and consumer cost.

The variable costs of production of components are those incremental costs associated with that component. The major categorical contributors to variable costs are direct labor, direct materials, and variable burden. Other minor contributors to variable cost such as setup costs, where applicable, are included in the variable burden rate.

# ELEMENTS OF CONSUMER COST

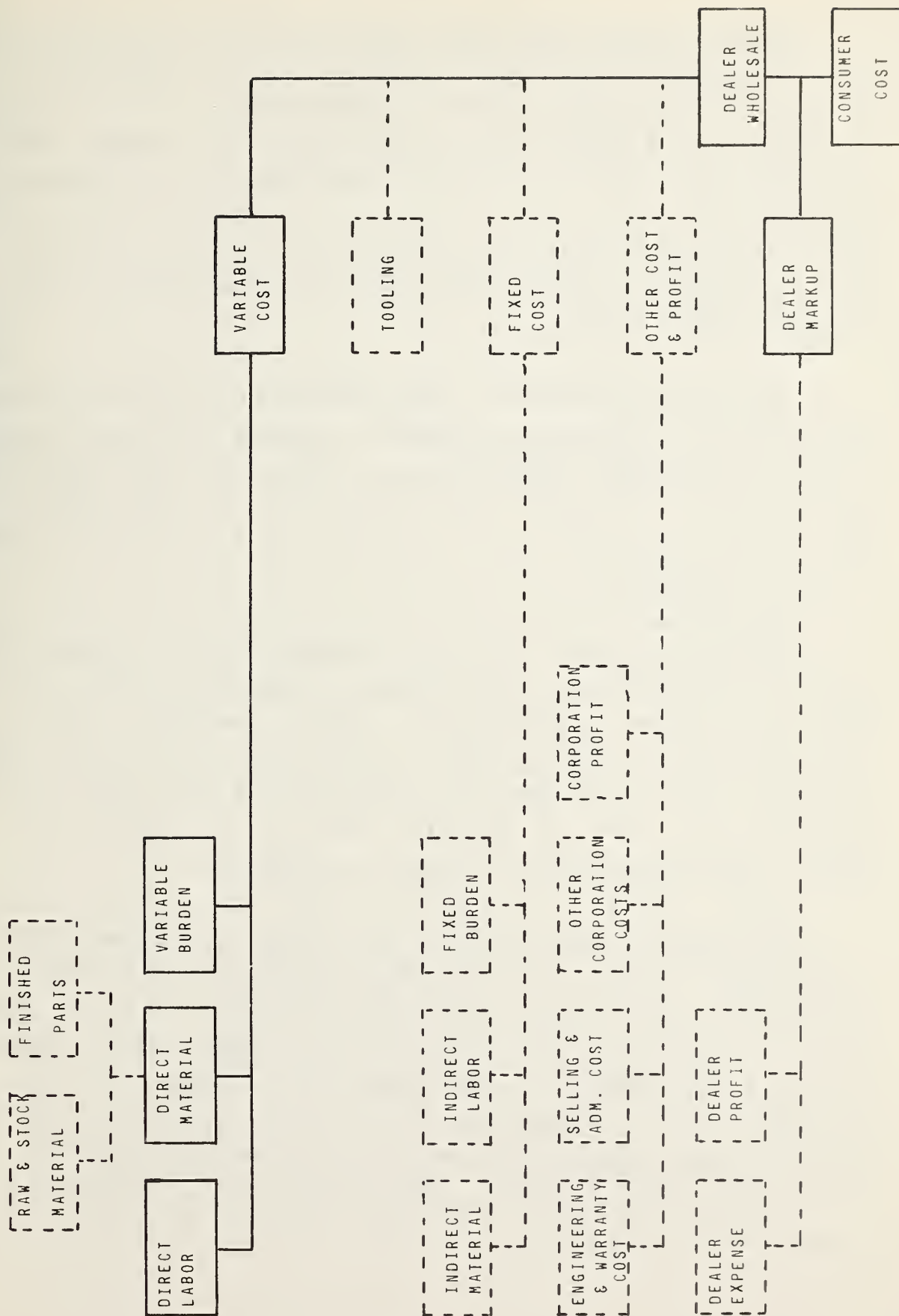


FIGURE 1

Direct labor costs are determined as an average rate depending on the worker classification required to perform the tasks identified in the process study (e.g., punch press operator, drill press operator, machinist). Average labor rates are determined from Union records, Department of Labor statistics, or a combination thereof. Labor fringe benefits and standard allowance for less than 100 percent labor efficiency are included in the average labor rate.

For each component, the process analysis identified the operation, type of equipment, pieces per hour, number of men, and number of machines. This data when extended by information from the data bank and all component operations summarized will produce the total direct labor cost per component.

Direct material costs are those costs associated with the purchase of all material required in the production process. Accordingly, direct material costs include the cost of not only the material in the finished component, but also that of the material scrapped minus salvage price, due to material removal or incorrectly worked components that cannot be salvaged.

Variable burden costs are estimated charges that attempt to account for all other expenses due to the production process and that vary directly with the production volume and that contribute to the cost of sales. Examples of sources of such expenses include, but are not limited to, perishable tools (e.g., drill bits, spot welding tips), fuel and power requirements and direct supervision and clerical. The total of all expenses

vary with the production quantity is estimated, based on a production planning volume. The sum of these expenses is then apportioned to each component on some logical scheme. The amount of apportionment is known as a variable burden rate.

Several methods of applying variable burden have been popularly accepted in the past as well as during current times. Total costs that are apportioned on the number of pieces produced, or material usage, misrepresent true costs whenever parts of different sizes or complexities are produced. Costs apportioned on direct labor misrepresent true costs in a highly automated production process.

This study utilizes a burden rate applied on occupancy time in a given machine, or station, performing a task during the production process. Burden rates are calculated on basis of a combination of machine or station complexity, cycle time, area occupied, and other considerations that more realistically reflect the true rate of apportionment of total variable expenses.

The cost development process and teardown procedure requires that each component be weighed, tagged with identification data, and analyzed for general type of material and manufacturing method utilized. Experienced personnel qualified by many years of production processing were employed to develop the basic data. The processing method, specific manufacturing operation, type of equipment, pieces per hour, number of men, number of machines, general type of material, rough weight of material and tooling costs were all elements of data furnished by the process engineer. A finite estimating



and processing technique utilizes this basic data plus model year economics and volumes contained in a data bank to extend the data into consumer cost.

The data bank contains approximately six hundred operation rates and over sixty materials utilized in the automotive type industry and covers twelve model year economics. In this study, the terms "Model Year Economics" and "Model Year Production Volumes" are utilized. The term model year directly relates to a designated year of a vehicle design. Normally in the United States, the model year starts in retail sales approximately in September. The volume is related to the number of vehicles produced of a specific design year vehicle. The term economics relates to the average cost elements involved in the production of a specific car year. The model production years normally are not related to the calendar year or a corporation fiscal year. For this study, the Contract Technical Manager designated the Model Year Economics to be 1979.

The Dealer Wholesale Cost for this study was developed by use of the Macro-analysis Method. A factor expressing the relationship of the variable cost to the Dealer Wholesale Cost was obtained from studying financial data related to the specific industry or manufacturer of the product. The macro-analysis study utilized data obtained from public files, annual financial reports, the 10K Report filed annually by the United States manufacturers and previous cost studies of similar products. The variable cost multiplied by the factor will produce the dealer wholesale cost.

Although other methods can be used to derive a dealer wholesale cost, it is believed by the Contractor



that the variable cost macro-analysis factor method produces an acceptable average dealer wholesale cost. The macro-analysis factor includes:

- A. Indirect labor - these costs are determined by apportioning the total estimated wages for indirect labor over the planned production volume. Indirect labor is comprised of, but not limited to, supervision and management, clerical, janitorial, plant security, etc. The total labor cost is not affected by variations in the production rate.
- B. Indirect material - these costs are determined by apportioning the total estimated costs for all material necessary for the proper functioning of the manufacturing plant and not related to the finished product over the planned production volume. Indirect materials are comprised of, but not limited to, stationery and office supplies, janitorial supplies, maintenance supplies, first aid and medical supplies, etc.
- C. Fixed Burden - is determined by apportioning the remaining estimated expenses related to the operation of a manufacturing plant over the planned production volume. All such expenses are conveniently accumulated categorically as burden. Such expenses are comprised of, but not limited to, property taxes, insurance costs, depreciation charges on buildings and capital equipment, etc.

D. Tooling Cost - is determined by apportioning the total expense by special tooling to manufacture a component over the entire life production volume of that component. This cost factor could vary as the component or sub-component could have several years application beyond the study period of a program. Further, the component or sub-component could be extended over several product lines. Thus the years of amortization and production volumes could have a definite bearing on the tooling cost of the component. With this knowledge, the process engineer would be required to use judgment in the application of the amortization and volume factor.

E. Other Cost and Profit - include items of engineering cost, warranty costs, selling and administrative costs, corporate burden and taxes (excluding factory burden and taxes), corporate depreciation and maintenance (excluding factory depreciation and maintenance), and other corporate costs and profit.

The dealer wholesale cost could be derived by the method of applying individual detailed cost factors stated above to the variable cost. This would produce a very accurate dealer wholesale cost. However, the data to accomplish this would not be available publicly or could it be expected that such confidential data would be made available for study groups.

Dealer Markup is the summation of all costs incurred in the operation of a dealership (salaries, taxes, depreciation, advertising, maintenance, etc.) and the dealer's profit. The Contractor was cognizant of a potential problem in attempting to arrive at an equitable dealer markup to apply in the cost calculations. The United States dealer is an independent business man over whom the manufacturer can exercise only limited controls. Although manufacturers have suggested retail prices, the dealer is actually free to bargain with each customer to establish the selling price for a vehicle. For this study it is assumed that the dealer's markup is based upon the full suggested price and is reflected in the consumer cost of the system or components studied.

Appendix B contains photographs for each system studied. These photographs provide a quick overview of the various systems.

Cost and weight data in Appendix A shows data to four decimal places. This does not indicate the degree of accuracy, but rather the result of the system used to develop the final weight and costs.

## INTEGRATED COST SAMPLING PLAN

The Contractor developed an Integrated Cost Sampling Plan that provide for the selection of specimens that were not only high volume, but were representative of typical side marker lamp systems of the major United States car manufacturers for the major passenger car size classes. Table 1 indicates those 1970 model systems selected and also the baseline system for each major car manufacturer.

A standard automotive teardown cost processing method was used to develop the specimens weight and consumer costs. The differential cost and weight between the 1970 implemented models and the baseline systems was considered the implementation cost and weight for the selected vehicle. The data are compared and presented in Table 2 and were extracted from detail summary information in Appendix A.

Table 3 through 6 presents the average implementation weight and costs of vehicles studied in size class of vehicles. For each class of vehicles studied, a weighted implementation weight and consumer cost was derived based on the 1970 model production volume.

Table 7 presents a weighted average United States vehicle implementation consumer cost and weight variance based on 1979 model size-class volumes applied to the weighted by size class implemented weight variance and consumer cost derived from the models studied.

Table 8 reflects implementation data pertaining to selected high volume foreign models and a high volume United States luxury vehicle.

Initially, it was planned to use the 1969 Chrysler Reflector System as the baseline for all vehicles. The study indicated this baseline system almost met the standard except for the lamp, socket and wire harness. It was agreed by the Contract Technical Manager and the Contractor that a simple baseline system would be established for the major car manufacturers. A 1968 Chrysler Dart unit was selected for the baseline of the Chrysler units and foreign vehicles.

On any system combining other light functions in the same housing, cost and weight were prorated.

On 1 November 1976, an amendment was published to the standard which allowed for high intensity rectangular headlamps. It was agreed that for this study, only the consumer cost and weight would be developed for one lamp. The Contractor did survey the 1980 car models to determine the extent of penetration of the industry by the high intensity lamps. This data is presented in Table 9.

Appendix A presents cost and weight data of systems studied.

Appendix B presents photographs of the systems studied.



TABLE 1  
 FMVSS 108 LAMPS, REFLECTIVE DEVICES  
 AND ASSOCIATED EQUIPMENT  
 MAKES AND MODELS OF SIDE MARKER LAMPS STUDIED

<u>MANUFACTURER</u>	<u>1970</u>	<u>BASELINE VEHICLES</u>
AMERICAN MOTORS	GREMLIN	1969 AMERICAN RAMBLER
CHRYSLER	VALIANT SATELLITE PLYMOUTH	1968 DART
FORD	MAVERICK FAIRLANE GALAXIE MERCURY COUGAR <sup>1</sup>	1969 MUSTANG
GENERAL MOTORS	CHEVROLET NOVA CHEVROLET MALIBU <sup>1</sup> CHEVROLET IMPALA CHEVROLET CAMARO BUICK ELECTRA CADILLAC DE VILLE	1969 CHEVROLET CHEVELLE
TOYOTA	CORONA	
VOLKSWAGEN	BEETLE	



TABLE 2

## FMVSS 108 LAMPS, REFLECTIVE DEVICES AND ASSOCIATED EQUIPMENT

## WEIGHT AND CONSUMER COST FOR VEHICLES STUDIED

(BASED ON 1970 MODEL PRODUCTION YEAR VOLUME AND 1979 MODEL PRODUCTION YEAR ECONOMICS)

<u>MANUFACTURER</u>	<u>MODEL</u>	<u>WEIGHT/VEHICLE IN POUNDS</u>				<u>CONSUMER COST-DOLLARS</u>		
		<u>VOLUME</u>	<u>SPECIMEN</u>	<u>BASELINE</u>	<u>IMPLEMENTATION</u>	<u>SPECIMEN</u>	<u>BASELINE</u>	<u>IMPLEMENTATION</u>
AMERICAN MOTORS	70 GREMLIN	SC 22,812	1.3634	1.2606	.1028	11.30	9.93	1.37
	70 VALIANT	C 241,557	1.7356	.7660	.9696	14.06	9.88	4.18
CHRYSLER	70 SATELLITE	I 160,736	1.9218	.7660	1.1558	14.42	9.88	4.54
	70 PLYMOUTH	S 267,797	1.7726	.7660	1.0066	13.66	9.88	3.78
FORD	70 MAVERICK	C 210,885	2.6382	2.5270	.1112	17.09	10.75	6.34
	70 FAIRLANE	I 328,710	3.2008	2.5270	.6738	17.06	10.75	6.31
	70 GALAXIE	S 807,328	3.6370	2.5270	1.1100	17.16	10.75	6.41
	70 MERCURY COUGAR	C 72,363	3.3504	2.5270	.8234	14.55	10.75	3.80
GENERAL MOTORS	70 CHEV NOVA	C 315,122	1.3116	1.0357	.2759	12.62	9.46	3.16
	70 CHEV MALIBU	I 394,317	.9660	1.0357	(.0697)	10.01	9.46	.55
	70 CHEV IMPALA	S 891,135	.9534	1.0357	(.0823)	8.60	9.46	(.86)
	70 CHEV CAMARO	C 124,899	.9692	1.0357	(.0665)	9.02	9.46	(.44)
	70 BUICK ELECTRA	S 402,744	1.1266	1.0357	.0909	10.23	9.46	.77
	70 CADILLAC DE VILLE	LS 214,903	3.9234	1.0357	2.8877	19.28	9.46	9.82
TOYOTA	70 CORONA	SC 35,414	1.6488	.7660	.8828	26.92	9.88	17.04
VOLKSWAGEN	70 BEETLE	SC 399,678	1.5866	.7660	.8206	16.13	9.88	6.25

TABLE 3

FMVSS 108 - LAMPS, REFLECTIVE DEVICES AND ASSOCIATED EQUIPMENT IMPLEMENTATION  
 WEIGHT AND CONSUMER COST FOR VEHICLE STANDARD  
 (BASED ON 1970 MODEL PRODUCTION YEAR VOLUME AND 1979 MODEL PRODUCTION YEAR ECONOMICS)

## CLASS - SUBCOMPACT - U.S. BUILT VEHICLES

<u>MANUFACTURER</u>	<u>MODEL</u>	<u>1970 VOLUME</u>	<u>WEIGHT/VEHICLE (POUNDS)</u>	<u>COST/VEHICLE \$</u>
AMC	1970 GREMLIN	22,812	.1028	1.37

TOTAL VEHICLES STUDIED 22,812

WEIGHTED AVERAGE OF STANDARDS STUDIED

.1028 1.37

TABLE 4

FMVSS 108 - LAMPS, REFLECTIVE DEVICES AND ASSOCIATED EQUIPMENT IMPLEMENTATION  
WEIGHT AND CONSUMER COST FOR VEHICLE STANDARD  
(BASED ON 1970 MODEL PRODUCTION YEAR VOLUME AND 1979 MODEL PRODUCTION YEAR ECONOMICS)

CLASS - COMPACT - U.S. BUILT VEHICLES				
<u>MANUFACTURER</u>	<u>MODEL</u>	<u>1970 VOLUME</u>	<u>WEIGHT/VEHICLE (POUNDS)</u>	<u>COST/VEHICLE \$</u>
CHRYSLER	1970 VALLANT	241,557	.9696	4.18
	1970 MAVERICK	210,885	.1112	6.34
FORD	1970 MERCURY COUGAR	72,363	.8234	3.80
	1970 CHEVROLET NOVA	315,122	.2759	3.16
GENERAL MOTORS	1970 CHEVROLET CAMARO	124,899	(.0665)	(.44)
TOTAL VEHICLES STUDIED		964,826		
WEIGHTED AVERAGE OF STANDARDS STUDIED			.4103	3.69

TABLE 5

FMVSS 108 - LAMPS, REFLECTIVE DEVICES AND ASSOCIATED EQUIPMENT IMPLEMENTATION  
 WEIGHT AND CONSUMER COST FOR VEHICLE STANDARD  
 (BASED ON 1970 MODEL PRODUCTION YEAR VOLUME AND 1979 MODEL PRODUCTION YEAR ECONOMICS)

## CLASS - INTERMEDIATE - U.S. BUILT VEHICLES

<u>MANUFACTURER</u>	<u>MODEL</u>	<u>1970 VOLUME</u>	<u>WEIGHT/VEHICLE (POUNDS)</u>	<u>COST/VEHICLE \$</u>
CHRYSLER	1970 SATELLITE	160,736	1.1558	4.54
FORD	1970 FAIRLANE	328,710	.6738	6.31
GENERAL MOTORS	1970 CHEVROLET MALIBU	394,317	(.0697)	.55
TOTAL VEHICLES STUDIED				883,763
WEIGHTED AVERAGE OF STANDARDS STUDIED				.4297
				3.41

TABLE 6

FMVSS 108 - LAMPS, REFLECTIVE DEVICES AND ASSOCIATED EQUIPMENT IMPLEMENTATION  
WEIGHT AND CONSUMER COST FOR VEHICLE STANDARD  
(BASED ON 1970 MODEL PRODUCTION YEAR VOLUME AND 1979 MODEL PRODUCTION YEAR ECONOMICS)

CLASS - STANDARD - U.S. BUILT VEHICLES			
<u>MANUFACTURER</u>	<u>MODEL</u>	<u>1970 VOLUME</u>	<u>WEIGHT/VEHICLE (POUNDS)</u>  <u>COST/VEHICLE \$</u>
CHRYSLER	1970 PLYMOUTH	267,797	1.0066  3.78
	1970 GALAXIE	807,328	1.1100  6.41
GENERAL MOTORS	1970 CHEVROLET IMPALA	891,135	(.0823)  (.86)
	1970 BUICK ELECTRA	402,744	.0909  .77
TOTAL VEHICLES STUDIED		2,369,004	
WEIGHTED AVERAGE OF STANDARDS STUDIED			.4766  2.42

TABLE 7

TOTAL U.S. INDUSTRY  
WEIGHTED AVERAGE CONSUMER COST AND WEIGHT INCREASE PER  
VEHICLE RESULTING FROM THE IMPLEMENTATION OF FMVSS 108 IN 1970  
(BASED ON 1979 MODEL PRODUCTION YEAR VOLUME AND ECONOMICS)

CLASS	1979 MODEL PRODUCTION VOLUME	STUDY WEIGHTED AVERAGE WEIGHT/VEHICLE (POUNDS)	STUDY WEIGHTED AVERAGE COST/VEHICLE \$
SUBCOMPACT	1,388,755	.1028	1.37
COMPACT	2,239,350	.4103	3.69
INTERMEDIATE	2,444,659	.4297	3.41
STANDARD	2,078,430	.4766	2.42
TOTAL U.S. INDUSTRY	8,151,194	.3806	2.89
LESS VEHICLES BELOW			
LUXURY STANDARD	428,729		
LUXURY INTERMEDIATE	244,167		
SPECIALTY	533,887		
TOTAL U.S. INDUSTRY	9,357,977		



TABLE 8

FMVSS 108 - LAMPS, REFLECTIVE DEVICES AND ASSOCIATED EQUIPMENT IMPLEMENTATION  
WEIGHT AND CONSUMER COST FOR VEHICLE STANDARD  
(BASED ON 1970 MODEL PRODUCTION YEAR VOLUME AND 1979 MODEL PRODUCTION YEAR ECONOMICS)

CLASS - FOREIGN VEHICLES AND SPECIALTY VEHICLES			
<u>MANUFACTURER</u>	<u>MODEL</u>	<u>1970 VOLUME</u>	<u>WEIGHT/VEHICLE (POUNDS)</u>
<u>COST/VEHICLE</u> <u>\$</u>			
FOREIGN MANUFACTURER			
TOYOTA	1970 CORONA	35,414	.8828
VOLKSWAGEN	1970 BEETLE	399,678	.8206
TOTAL FOREIGN VEHICLES STUDIED		435,092	
WEIGHTED AVERAGE OF STANDARDS STUDIED			.8257
SPECIALTY - U.S. MANUFACTURER			
GENERAL MOTORS	1970 CADILLAC DEVILLE	214,903	2.8877
			9.82

## COST EVALUATION - SIDE MARKER LAMPS

FMVSS 108 applying to vehicles of eighty inches or more in width was effective on 1 January 1968. An amendment, effective January 1, 1970 required side lamps on passenger cars. An amber lamp positioned as far front as possible and a red lamp as far to the rear as possible were required. It was permissible to achieve the side lighting effect by design of the front or rear lighting components.

This Contract required to determine the implementation cost and weight variance due to the implementation of FMVSS 108 by the installation of lamps to the side marker system. From Table 7, the United States industry less special luxury cars indicated an implementation consumer cost of \$2.89 and a weight increase of .38 pounds. This cost is based on 1979 Model Year Economics. This weighted average is based on 87.1% of the United States industry volume. From Table 8, the implementation of the standard on selected foreign vehicles indicated a per vehicle consumer cost of \$7.13 and a weight variance of .8257 pounds. Table 8 also presented a United States luxury vehicle that had an implementation per vehicle cost of \$9.82 and a weight increase of 2.89 pounds.

Probably the most elaborate marker lamp system studied was the 1970 Cadillac DeVille. A prorated cost and weight variance was made to develop the data related to the side marker system.

No secondary weight or consumer cost is included in this study.

## CONCLUSION

Based upon this study and the weighted volume method of determining the industry average implementation consumer cost and weight, the implementation consumer cost was \$2.89 and the weight increase was .38 pounds. A study of the components and a review of the photographs will indicate that a certain amount of the cost and weight could be assessed to design requirements. An alternate to this study could be the establishment of a base system that meets the requirement without any design influence. The total system could then be evaluated on the basis of implementation weight and consumer cost plus design weight and consumer cost. However, the study does reflect the reaction by the industry to implement the standard.

## COST EVALUATION - HIGH INTENSITY LAMPS

On 1 November 1976 an amendment was published which allowed for high intensity rectangular head lamps. It was agreed that this study would only involve a determination of consumer cost and weight of a typical high intensity headlamp. A Guide Halogen lamp was purchased and the typical automotive cost estimate and weight study was made. The consumer cost was estimated to be \$3.21 and the weight was 1.1 pounds.

## CONCLUSION

In the 1980 model production year vehicles the industry is using more of the high intensity lights. Table 9 presents the list of 1980 models using high intensity lights. A typical implementation study could be made of the various combinations of highlights to determine consumer cost and weight variance in the industry.

TABLE 9  
1980 USAGE OF HIGH INTENSITY HALOGEN  
HEADLAMPS -- HIGH BEAM

MANUFACTURER	MODEL	HALOGEN HI BEAM HEADLAMPS		
		STANDARD	OPTIONAL	NOT USED
AMERICAN MOTORS	SPIRIT			X
	CONCORD			X
	EAGLE			X
CHRYSLER	HORIZON			X
	VOLARE			X
	GRAN FURY			
	OMNI		X	
	DIPLOMAT	S TYPE	X	
	ASPEN		X	
	ST REGIS		X	
	MIRADA		X	
	CORDOBA		X	
	LE BARON		X	
	NEW YORKER		X	
FORD	PINTO			X
	MUSTANG	X		
	FAIRMONT			X
	FUTURA	X		
	GRANADA			X
	THUNDERBIRD	X		
	LTD	X		
	BOBCAT			X
	CAPRI	X		
	ZEPHYR	X		
	MONARCH	X		
	COUGAR	X		
	MARQUIS	X		
	FIESTA			X

TABLE 9  
(CONTINUED)

MANUFACTURER	MODEL	HALOGEN HI BEAM HEADLAMPS		
		STANDARD	OPTIONAL	NOT USED
FORD (cont)	CONTINENTAL	X		
	MARK VI	X		
	VERSAILLES	X		
GENERAL MOTORS	SKYHAWK		X	
	SKYLARK		X	
	CENTURY		X	
	REGAL	SPORT	X	
	LE SABRE	SPORT	X	
	ELECTRA		X	
	RIVIERA	S TYPE	X (OTHERS)	
	DE VILLE	X		
	ELDORADO	X		
	SEVILLE	X		
	CHEVETTE			X
	MONZA			X
	CAMARO		X	
	CITATION			X
	MALIBU		X	
	MONTE CARLO		X	
	IMPALA		X	
	CORVETTE	X		
	STARFIRE		X	
	OMEGA		X	
	CUTLASS	CALAIS	X	
	88/98		X	
	TORONADO	X		
	SUNBIRD			X
	PHOENIX			X
	FIREBIRD		X	
	LEMANS			X
	GRAND PRIX		X	
	BONNEVILLE		X	

## APPENDIX A

### SUMMARY OF COMPONENT COST AND WEIGHT DATA



FMVSS - 108 SIDE MARKER LAMPS SUMMARY OF COMPONENT COST AND WEIGHT DATA

Item	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$							Dealer Markup	Consumer Cost
					VARIABLE COST				Total	Whole- sale Cost			
					Material	Labor	Burden						
1970 AMERICAN MOTORS - GREMLIN													
SIDE MARKER LAMPS - FRONT	2	VAR	.4394	460.	.6647	1.2400	.8528	2.7575	3.6876	.7537		4,4413	
SIDE MARKER LAMPS - REAR	2	VAR	.9240	510.	1.3809	1.5585	1.3215	4.2609	5.6981	1.1646		6,8627	
TOTAL	4	VAR	1.3634	970.	2.0456	2.7985	2.1743	7.0184	9.3857	1.9183		11.3040	
1970 CHRYSLER - VALIANT													
SIDE MARKER LAMPS - FRONT	2	VAR	.7856	317.	1.0561	1.8538	1.6221	4.5320	6.0606	1.2364		7.2970	
SIDE MARKER LAMPS - REAR	2	VAR	.9500	367.	1.0770	1.7388	1.3819	4.1977	5.6135	1.1452		6.7587	
TOTAL	4	VAR	1.7356	684.	2.1331	3.5926	3.0040	8.7297	11.6741	2.3816		14.0557	
1970 CHRYSLER - SATELLITE													
SIDE MARKER LAMPS - FRONT	2	VAR	.9518	367	1.1526	1.8538	1.6221	4.6285	6.1897	1.2627		7.4524	
SIDE MARKER LAMPS - REAR	2	VAR	.9700	667.	1.2088	1.7388	1.3819	4.3295	5.7898	1.1811		6.9709	
TOTAL	4	VAR	1.9218	1034.	2.3614	3.5926	3.0040	8.9580	11.9795	2.4438		14.4233	
1970 CHRYSLER - PLYMOUTH FURY													
SIDE MARKER LAMPS - FRONT	2	VAR	.3750	180.	.9793	1.0840	.5936	2.6569	3.5531	.7248		4.2779	
SIDE MARKER LAMPS - REAR	2	VAR	1.3976	551	1.3087	1.9545	2.5660	5.8292	7.7954	1.5903		9.3857	
TOTAL	4	VAR	1.7726	731	2.2880	3.0385	3.1596	8.4861	11.3485	2.3151		13.6636	
1970 FORD - MAVERICK													
SIDE MARKER LAMPS - FRONT	2	VAR	.9630	382.	1.1155	2.1708	1.4667	4.7530	6.3562	1.2967		7.6529	
SIDE MARKER LAMPS - REAR	2	VAR	1.6684	467.	1.7095	2.4614	1.6876	5.8585	7.8346	1.5983		9.4329	
TOTAL	4	VAR	2.6382	849.	2.8250	4.6322	3.1543	10.6115	14.1908	2.8950		17.0858	

FMVSS - 108 SIDE MARKER LAMPS SUMMARY OF COMPONENT COST AND WEIGHT DATA

Item	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$							Dealer Markup	Consumer Cost
					VARIABLE COST				Whole- sale Cost				
					Material	Labor	Burden	Total					
1970 GENERAL MOTORS – CHEVROLET IMPALA													
SIDE MARKER LAMPS – FRONT	2	VAR	.4460	212.	.7890	1.0553	.8051	2.6494	3.5430		.7100	4.2530	
SIDE MARKER LAMPS – REAR	2	VAR	.5074	192.	.8378	1.0553	.8051	2.6982	3.6083		.7361	4.3444	
TOTAL	4	VAR	.9534	404.	1.6268	2.1106	1.6102	5.3476	7.1513		1.4461	8.5974	
1970 GENERAL MOTORS – CHEVROLET CAMARO													
SIDE MARKER LAMPS – FRONT	2	VAR	.5678	262.	.7960	1.1089	.9234	2.8283	3.7823		.7716	4.5539	
SIDE MARKER LAMPS – REAR	2	VAR	.4014	352.	.7596	1.1040	.9128	2.7764	3.7129		.7574	4.4703	
TOTAL	4	VAR	.9692	614.	1.5555	2.2129	1.8362	5.6047	7.4952		1.5290	9.0242	
1970 GENERAL MOTORS – BUICK ELECTRA													
SIDE MARKER LAMPS – FRONT	2	VAR	.7836	292.	1.3040	1.1948	1.1364	3.6352	4.8614		.9917	5.8531	
SIDE MARKER LAMPS – REAR	2	VAR	.3430	252.	.7308	1.0956	.8937	2.7201	3.6376		.7421	4.3797	
TOTAL	4	VAR	1.1266	544.	2.0348	2.2904	2.0301	6.3553	8.4990		1.7338	10.2328	
1970 GENERAL MOTORS – CADILLAC DEVILLE													
SIDE MARKER LAMPS – FRONT	2	VAR	3.5648	520.	3.9636	1.6007	1.8771	7.4414	9.9514		2.0301	11.9815	
SIDE MARKER LAMPS – REAR	2	VAR	.3586	380.	1.3111	1.7911	1.4322	4.5344	6.0639		1.2370	7.3009	
TOTAL	4	VAR	3.9234	900.	5.2747	3.3918	3.3093	11.9758	16.0153		3.2671	19.2824	
1970 TOYOTA – CORONA													
SIDE MARKER LAMPS – FRONT	2	VAR	1.0620	788.	2.2910	3.3854	4.5439	10.2203	13.6676		2.7882	16.4558	
SIDE MARKER LAMPS – REAR	2	VAR	.5868	440.	1.1430	2.3910	2.9650	6.4990	8.6911		1.7730	10.4641	
TOTAL	4	VAR	1.6488	1225.	3.4340	5.7764	7.5089	16.7193	22.3587		4.5612	26.9199	

FMVSS - 108 SIDE MARKER LAMPS SUMMARY OF COMPONENT COST AND WEIGHT DATA

Item	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$							Dealer Markup	Consumer Cost
					VARIABLE COST			Total	Whole- sale Cost				
					Material	Labor	Burden						
1970 FORD – FAIRLANE													
SIDE MARKER LAMPS – FRONT	2	VAR	1.7234	372.	1.7955	2.1324	1.3525	5.2804	7.0615	1.5564	8.6179		
SIDE MARKER LAMPS – REAR	2	VAR	1.4774	372.	1.4836	2.2001	1.5606	5.2443	7.0132	1.4307	8.4439		
TOTAL	4	VAR	3.2008	744.	3.2791	4.3325	2.9131	10.5247	14.0747	2.9871	17.0618		
1970 FORD – GALAXIE													
SIDE MARKER LAMPS – FRONT	2	VAR	2.0496	412.	2.0723	2.0244	1.3525	5.4492	7.2872	1.4866	8.7738		
SIDE MARKER LAMPS – REAR	2	VAR	1.5874	412.	1.7721	2.0832	1.3525	5.2078	6.9644	1.4207	8.3851		
TOTAL	4	VAR	3.6370	824.	3.8444	4.1076	2.7050	10.6570	14.2516	2.9073	17.1589		
1970 FORD – MERCURY COUGAR													
SIDE MARKER LAMPS – FRONT	2	VAR	1.8152	372.	1.5576	1.5976	1.3525	4.5077	6.0281	1.2297	7.2578		
SIDE MARKER LAMPS – REAR	2	VAR	1.5352	372.	1.6139	1.5634	1.3525	4.5298	6.0577	1.2358	7.2935		
TOTAL	4	VAR	3.3504	744.	3.1715	3.1610	2.7050	9.0375	12.0858	2.4655	14.5513		
1970 GENERAL MOTORS – CHEVROLET NOVA													
SIDE MARKER LAMPS – FRONT	2	VAR	.6526	272.	1.2332	1.1948	1.5008	3.9288	5.2540	1.0718	6.3258		
SIDE MARKER LAMPS – REAR	2	VAR	.6642	292.	1.2164	1.1948	1.5008	3.9120	5.2315	1.0672	6.2987		
TOTAL	4	VAR	1.3116	564.	2.4496	2.3896	3.0016	7.8408	10.4855	2.1390	12.6245		
1970 GENERAL MOTORS – CHEVROLET MALIBU													
SIDE MARKER LAMPS – FRONT	2	VAR	.4308	192.	.7761	1.0553	.8051	2.6365	3.5258	.7193	4.2451		
SIDE MARKER LAMPS – REAR	2	VAR	.5352	280.	1.3403	1.1811	1.0579	3.5793	4.7866	.9765	5.7631		
TOTAL	4	VAR	.9660	472.	2.1164	2.2364	1.8630	6.2158	8.3124	1.6958	10.0082		



FMVSS - 108 SIDE MARKER LAMPS SUMMARY OF COMPONENT COST AND WEIGHT DATA

Item	Req'd Per Vehicle	Material	Weight	Total Tooling (\$000)	COST PER VEHICLE \$							Dealer Markup	Consumer Cost
					VARIABLE COST				Total	Whole- sale Cost			
					Material	Labor	Burden						
1970 VOLKSWAGEN – BEETLE													
SIDE MARKER LAMPS – FRONT	2	VAR	1.4204	600.	2.3579	3.5033	2.0638	7.9250	10.5981	2.1620	12.7601		
SIDE MARKER LAMPS – REAR	2	VAR	.1662	420.	.4575	.5420	1.0932	2.0927	2.7986	.5709	3.3695		
TOTAL	4	VAR	1.5866	1020.	2.8154	4.0453	3.1570	10.0177	13.3967	2.7329	16.1296		
BASELINE VEHICLES													
1969 AMERICAN – RAMBLER													
SIDE MARKER LAMPS – FRONT	2	VAR	.2296	145.	.4802	.7362	1.1866	2.4030	3.2135	.6556	3.8691		
SIDE MARKER LAMPS – REAR	2	VAR	1.0310	275.	1.1305	1.0637	1.5675	3.7617	5.0305	1.0262	6.0567		
TOTAL	4	VAR	1.2606	420.	1.6107	1.7999	2.7541	6.1647	8.2440	1.6818	9.9258		
1969 FORD – MUSTANG													
SIDE MARKER LAMPS – FRONT	2	VAR	2.2090	120.	2.7626	.8642	1.1742	4.3020	5.7531	1.1736	6.9267		
SIDE MARKER LAMPS – REAR	2	VAR	.3180	95.	.4761	.7510	1.1483	2.3754	3.1766	.6480	3.8246		
TOTAL	4	VAR	2.5270	215.	2.7397	1.6152	2.3225	6.6774	8.9297	1.8216	10.7513		
1969 GENERAL MOTORS – CHEVROLET CHEVELLE													
SIDE MARKER LAMPS – FRONT	2	VAR	.5496	95.	.6440	.9116	1.4045	2.9601	3.9585	.8075	4.7660		
SIDE MARKER LAMPS – REAR	2	VAR	.4854	95.	.6022	.9116	1.0045	2.9183	3.9026	.7961	4.6987		
TOTAL	4	VAR	1.0350	190.	1.2462	1.8232	2.8090	5.8784	7.8611	1.6036	9.4647		
1968 CHRYSLER – DODGE DART													
SIDE MARKER LAMPS – FRONT	2	VAR	.3830	170.	.7362	.9215	1.4093	3.0670	4.1015	.8367	4.9382		
SIDE MARKER LAMPS – REAR	2	VAR	.3830	170.	.7362	.9215	1.4093	3.0670	4.1015	.8367	4.9382		
TOTAL	4	VAR	.7660	340.	1.4724	1.8430	2.8186	6.1340	8.2030	1.6734	9.8764		

FMVSS - 108 SIDE MARKER LAMPS SUMMARY OF COMPONENT COST AND WEIGHT DATA

[illegible]

FMVSS - 108 HIGH INTENSITY HEADLAMPS SUMMARY OF COMPONENT COST AND WEIGHT DATA

[illegible]





APPENDIX B

PHOTOGRAPHS

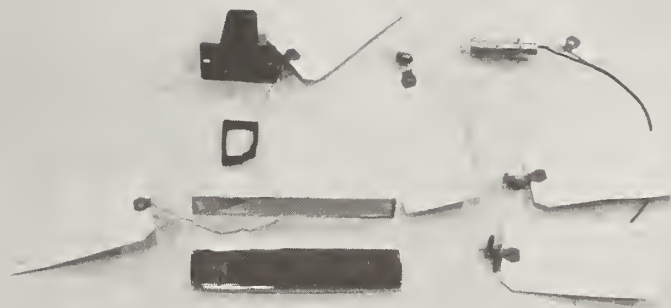
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1970 AMC GREMLIN  
FRONT MARKER LAMP



**70**  
**GREMLIN**  
**REAR**

1970 AMC GREMLIN  
REAR MARKER LAMP





1969 AMC AMERICAN RAMBLER  
FRONT MARKER LAMP ASSY



1969 AMC AMERICAN RAMBLER  
FRONT MARKER LAMP ASSY



1969 AMC AMERICAN RAMBLER  
REAR MARKER LAMP ASSY



1969 AMC AMERICAN RAMBLER  
REAR MARKER LAMP ASSY

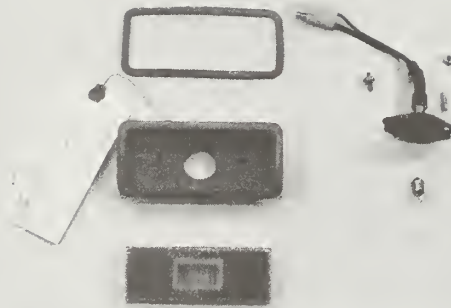


1969 CHRYSLER VALIANT  
FRONT MARKER LAMP



1969 CHRYSLER VALIANT  
REAR MARKER LAMP



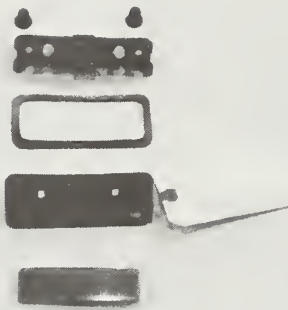


**70**  
**VALIANT**  
**FRONT**

1970 CHRYSLER VALIANT  
FRONT MARKER LAMP



1970 CHRYSLER VALIANT  
REAR MARKER LAMP



69  
SATELITE  
FRONT

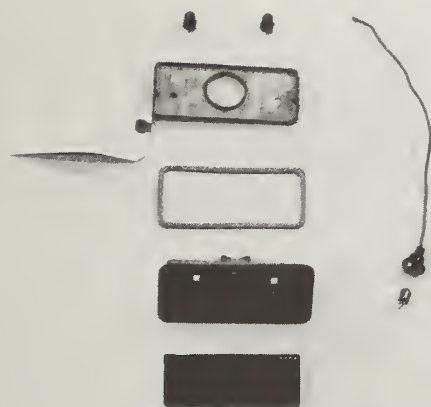
1969 CHRYSLER SATELITE  
FRONT MARKER LAMP



1969 CHRYSLER SATELITE  
REAR MARKER LAMP



1970 CHRYSLER SATELITE  
FRONT MARKER LAMP



**70**  
**SATELITE**  
**REAR**

1970 CHRYSLER SATELITE  
REAR MARKER LAMP





1969 CHRYSLER PLYMOUTH  
FRONT MARKER LAMP



1969 CHRYSLER PLYMOUTH  
REAR MARKER LAMP



1970 CHRYSLER PLYMOUTH  
FRONT MARKER LAMP



1970 CHRYSLER PLYMOUTH  
REAR MARKER LAMP



1970 CHRYSLER PLYMOUTH  
REAR MARKER LAMP



1970 CHRYSLER PLYMOUTH  
REAR MARKER LAMP





1968 CHRYSLER DART  
FRONT MARKER LAMP ASSY



1968 CHRYSLER DART  
FRONT MARKER LAMP ASSY



1968 CHRYSLER DART  
FRONT MARKER LAMP ASSY



1968 CHRYSLER DART  
REAR MARKER LAMP ASSY



1968 CHRYSLER DART  
REAR MARKER LAMP ASSY

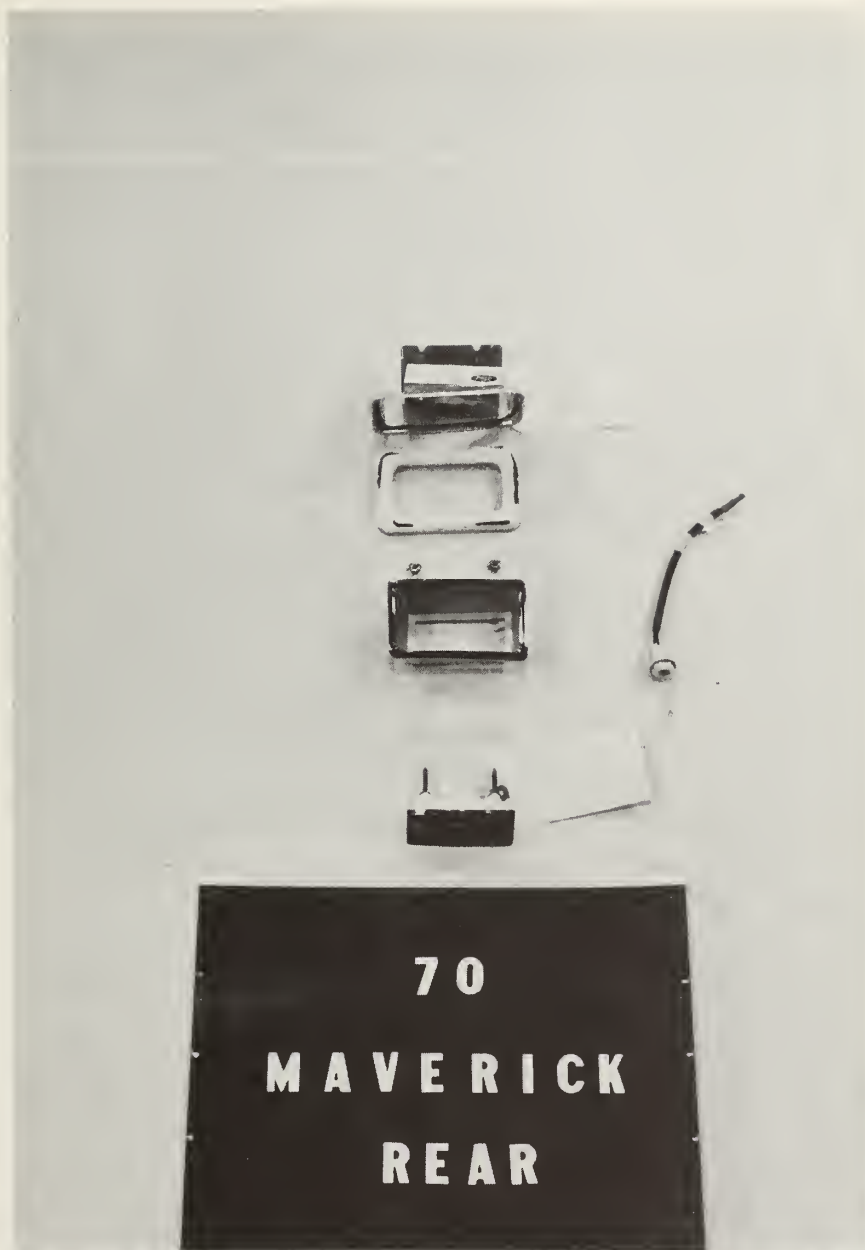


1970 FORD MAVERICK  
FRONT MARKER LAMP



1970 FORD MAVERICK  
FRONT MARKER LAMP





1970 FORD MAVERICK  
REAR MARKER LAMP



1970 FORD FAIRLANE  
REAR MARKER LAMP



1970 FORD FAIRLANE  
FRONT MARKER LAMP



70  
GALAXIE  
FRONT

1970 FORD GALAXIE  
FRONT MARKER LAMP



1970 FORD GALAXIE  
REAR MARKER LAMP



1970 FORD MERCURY COUGAR  
FRONT MARKER LAMP



70  
COUGAR  
REAR

1970 FORD MERCURY COUGAR  
REAR MARKER LAMP





1969 FORD MUSTANG  
FRONT MARKER LAMP ASSY



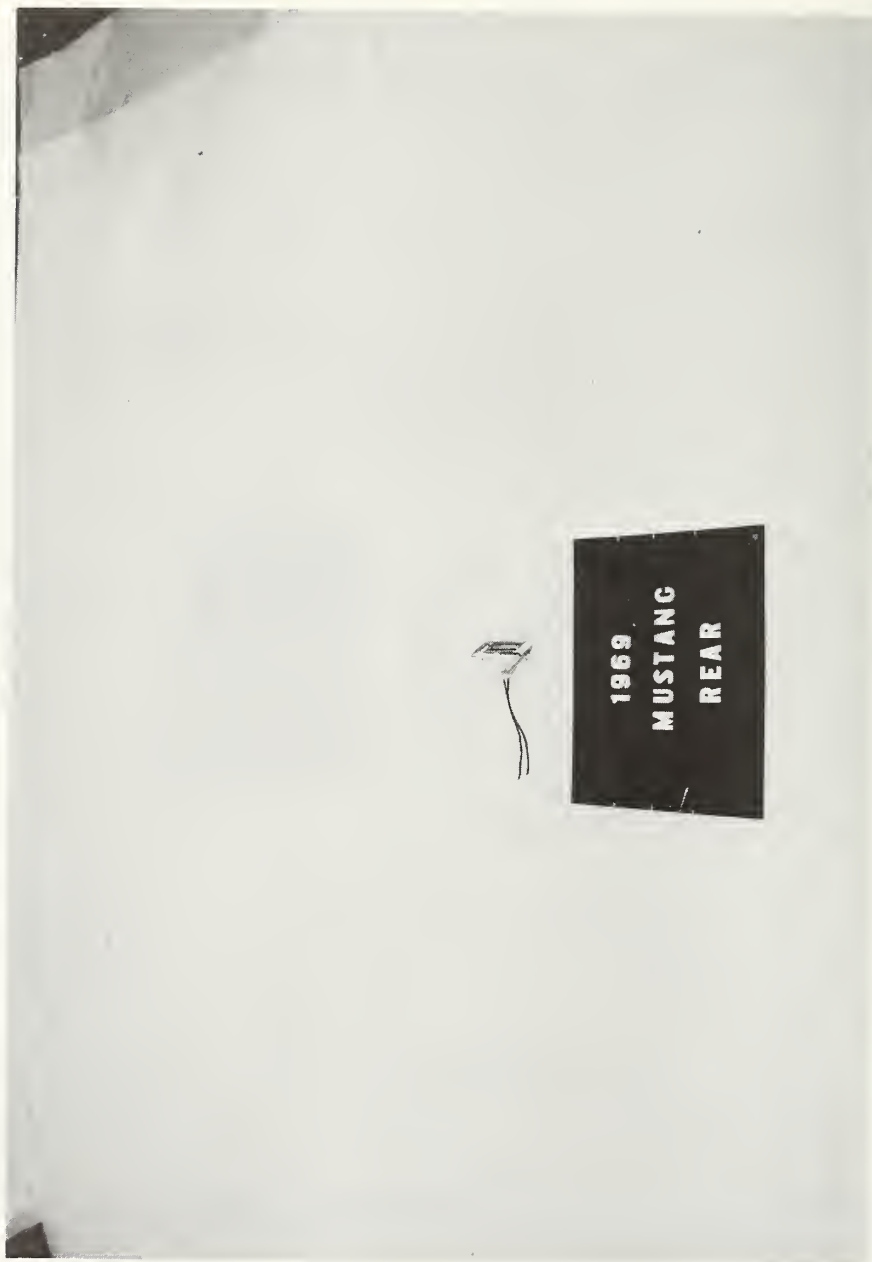
1969 FORD MUSTANG  
FRONT MARKER LAMP ASSY



1969 FORD MUSTANG  
FRONT MARKER LAMP ASSY



1969 FORD MUSTANG  
REAR MARKER LAMP ASSY



1969 FORD MUSTANG  
REAR MARKER LAMP ASSY

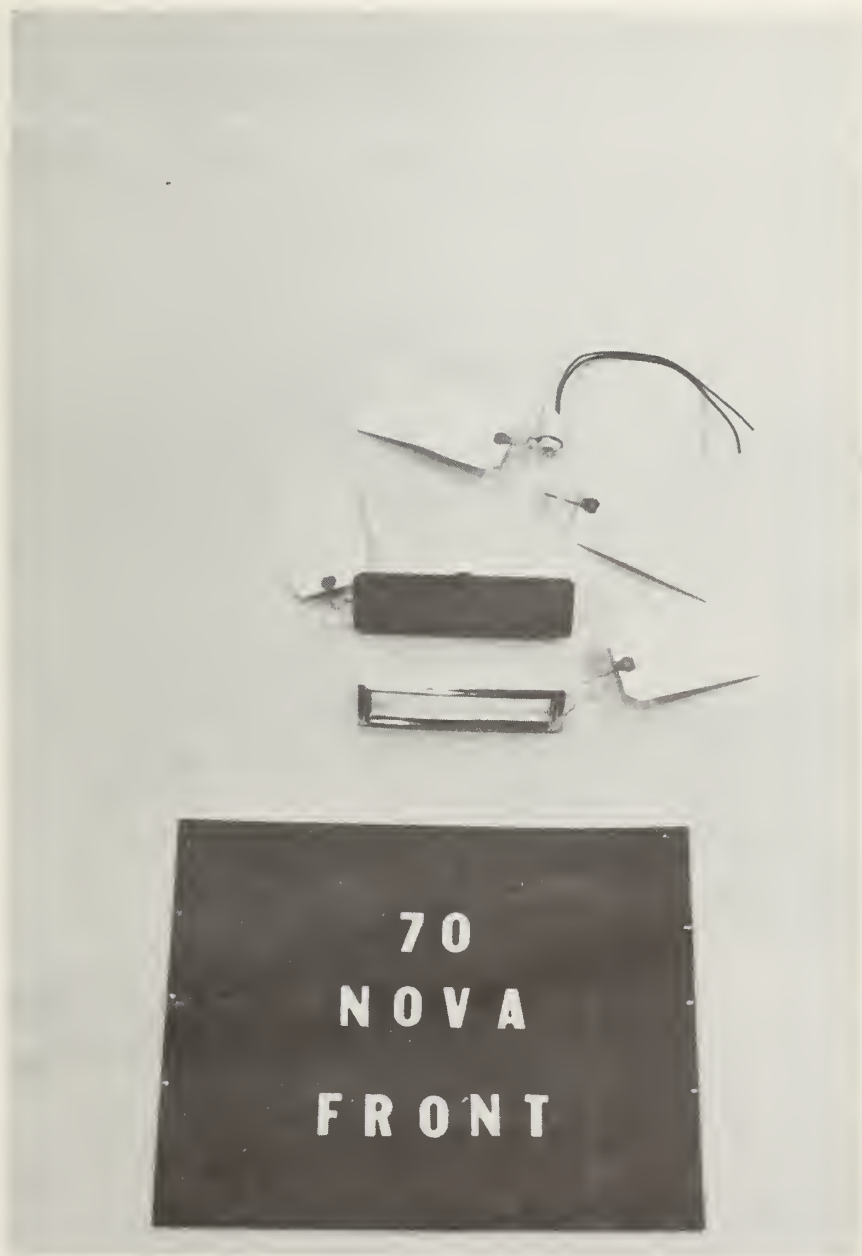


1969 FORD MUSTANG  
REAR MARKER LAMP ASSY

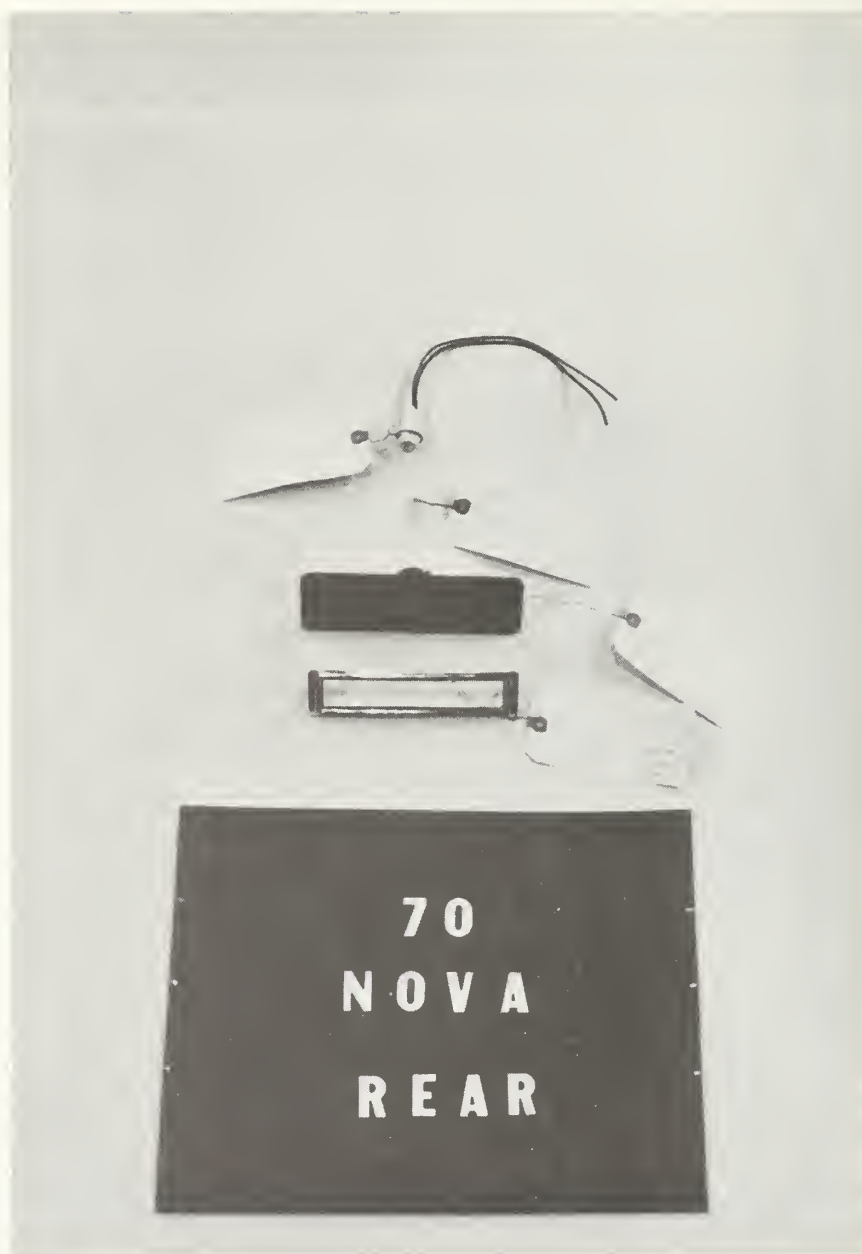


1970 GM CHEVROLET NOVA  
FRONT MARKER LAMP





1970 GM CHEVROLET NOVA  
FRONT MARKER LAMP



1970 GM CHEVROLET NOVA  
REAR MARKER LAMP



1970 GM CHEVROLET MALIBU  
FRONT MARKER LAMP



1970 GM CHEVROLET MALIBU  
REAR MARKER LAMP



1970 GM CHEVROLET IMPALA  
FRONT MARKER LAMP



1970 GM CHEVROLET IMPALA  
REAR MARKER LAMP



1970 GM BUICK ELECTRA  
FRONT MARKER LAMP

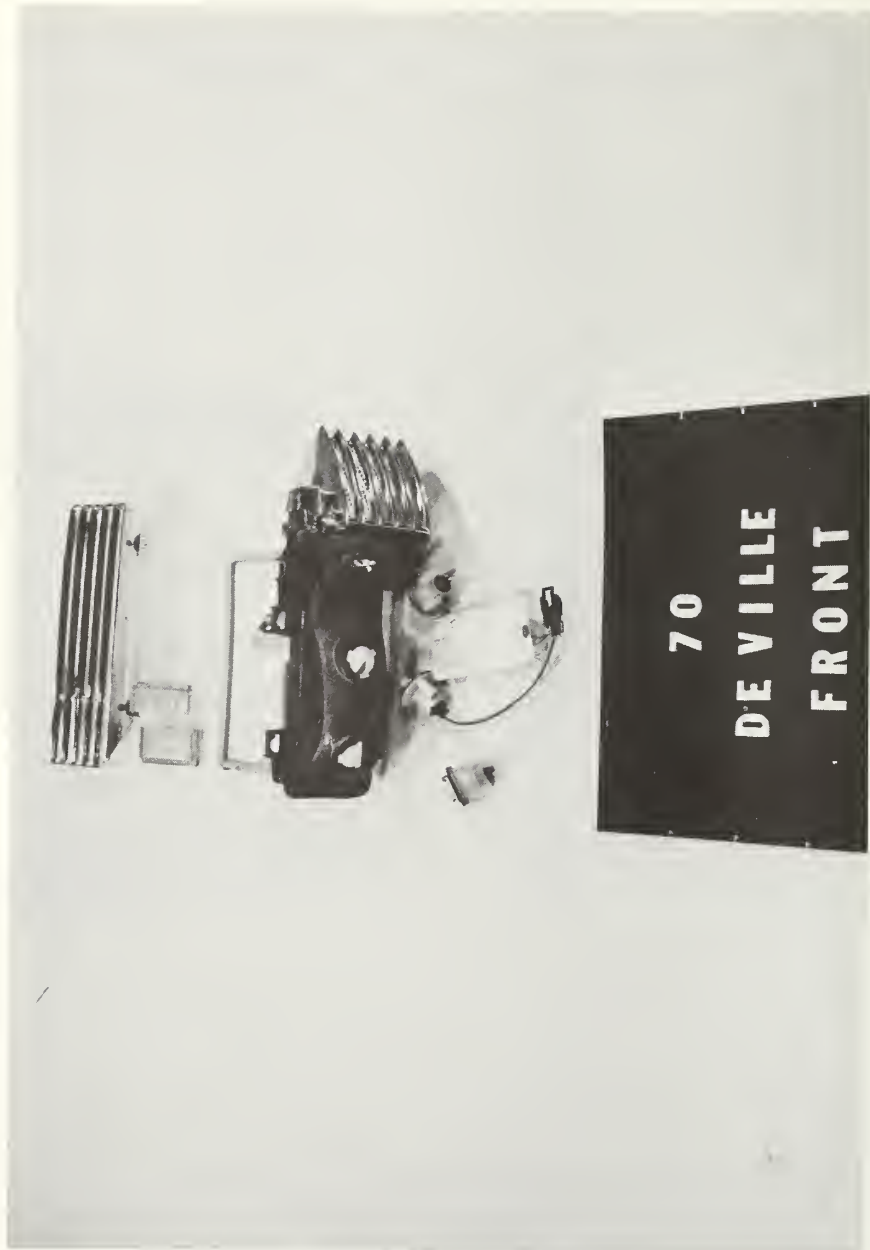




1970 GM BUICK ELECTRA  
REAR MARKER LAMP



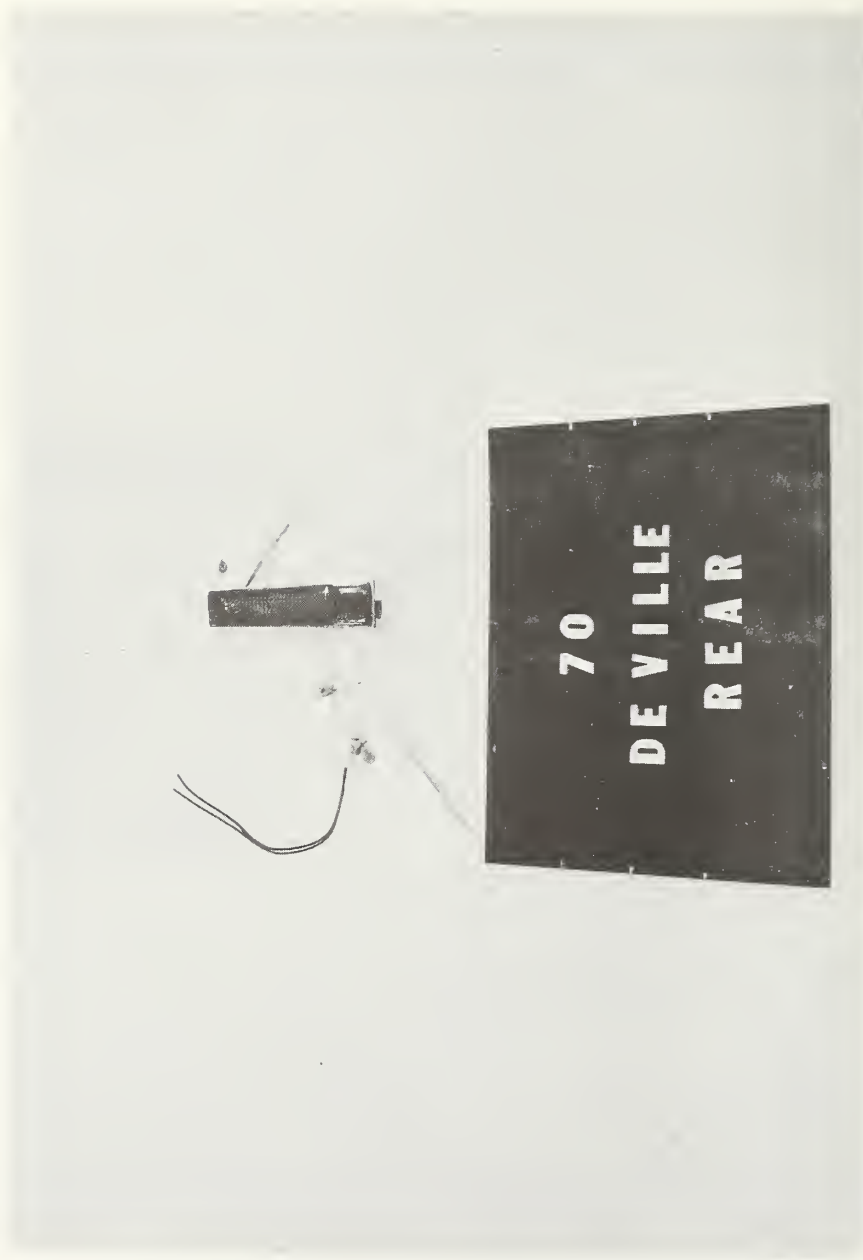
1970 GM CADILLAC DE VILLE  
FRONT MARKER LAMP



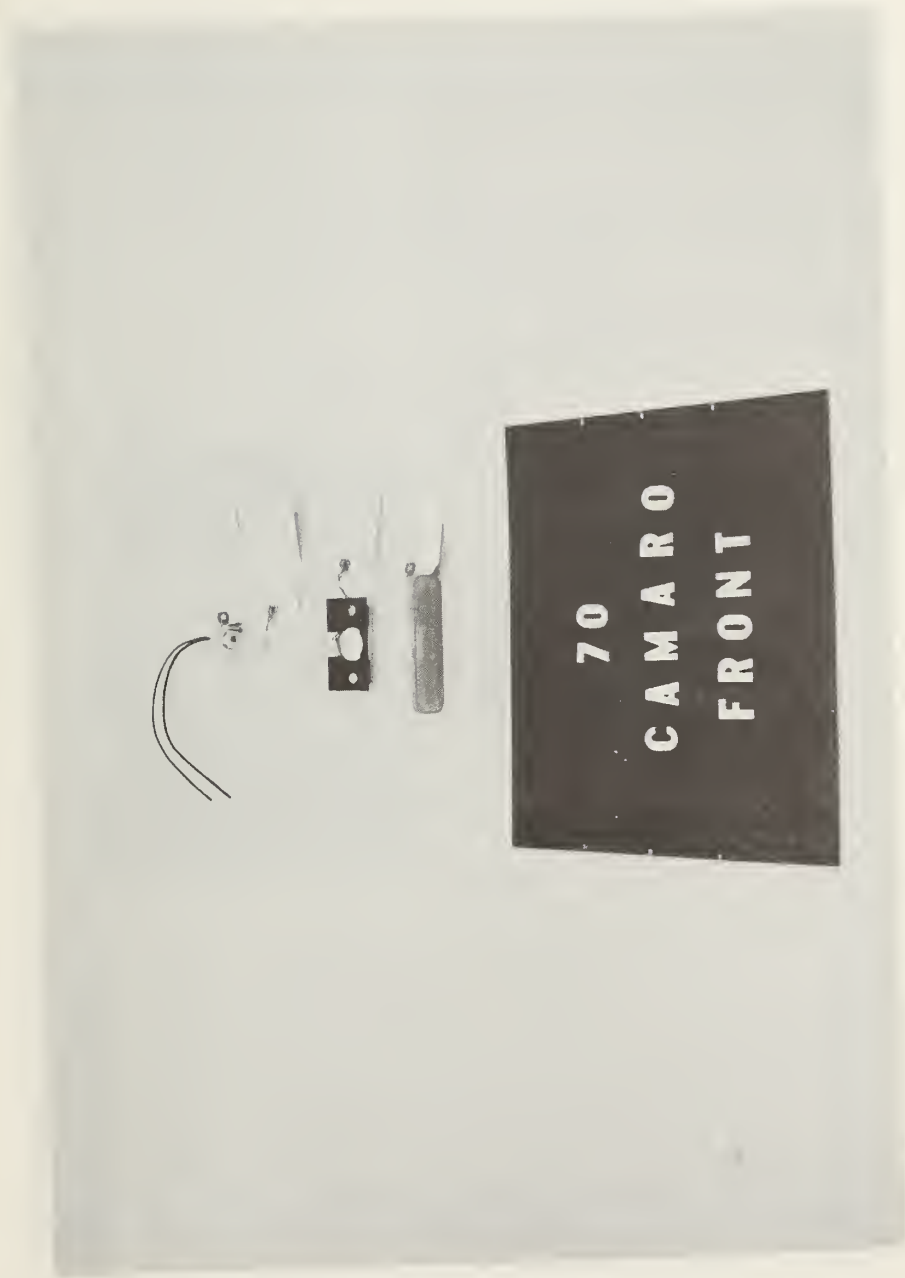
1970 GM CADILLAC DE VILLE  
FRONT MARKER LAMP



1970 GM CADILLAC DE VILLE  
FRONT MARKER LAMP



1970 GM CADILLAC DE VILLE  
REAR MARKER LAMP



1970 GM CHEVROLET CAMARO  
FRONT MARKER LAMP



1970 GM CHEVROLET CAMARO  
REAR MARKER LAMP





1969 GM CHEVROLET CHEVELLE  
FRONT MARKER LAMP ASSY



1969 GM CHEVROLET CHEVELLE  
FRONT MARKER LAMP ASSY



1969 GM CHEVROLET CHEVELLE  
REAR MARKER LAMP ASSY



1969 GM CHEVROLET CHEVELLE  
REAR MARKER LAMP ASSY



1970 TOYOTA CORONA  
FRONT MARKER LAMP



1970 TOYOTA CORONA  
FRONT MARKER LAMP



1970 TOYOTA CORONA  
REAR MARKER LAMP





1970 VOLKSWAGEN BEETLE  
FRONT MARKER LAMP



1970 VOLKSWAGEN BEETLE  
REAR MARKER LAMP



1970 VOLKSWAGEN BEETLE  
REAR MARKER LAMP



1970 VOLKSWAGEN BEETLE  
REAR SIDE MARKER & TAIL  
LAMP LENS



1970 VOLKSWAGEN BEETLE  
REAR SIDE MARKER & TAIL  
LAMP LENS



1970 VOLKSWAGEN BEETLE  
REAR SIDE MARKER & TAIL  
LAMP LENS



1970 VOLKSWAGEN BEETLE  
REAR SIDE MARKER & TAIL  
LAMP LENS



GUIDE QUARTZ HALOGEN





GUIDE QUARTZ HALOGEN



GUIDE QUARTZ HALOGEN



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